

mere local varieties are now deemed what are called "good species." Dr. Hooker and other botanists have shown how very widely distributed many of our common plants are. On another occasion I may enter on this subject.—A. W.

Besides these, there are the two following species of the extensive group of the Calandridæ, the former of which is very distinctly coloured with two transverse, yellowish-red, subinterrupted bands on the elytra:—

Sphenophorus Spinolæ, Sch. Gen. et Sp. Curcul. iv. p. 883 (1838).

Scyphophorus interstitialis, Sch. loc. cit. p. 856.

XXXIX.—On the Atlas and Axis of the Plesiosaurus.

By LUCAS BARRETT, F.G.S*.

[With a Plate.]

IN a young specimen of *Plesiosaurus* presented to the Geological Museum of the University of Cambridge by Thomas Hawkins, Esq., the atlas and axis have not coalesced, and are detached from the remainder of the cervical series. The axis is nearly entire; but the atlas has lost part of its posterior articular surface, and the whole of the second subvertebral wedge-bone. The interesting unanchylosed condition of the four bones composing the atlantal cup is a sufficient excuse for occupying a small portion of the time of the Section with a comparison of these bones with those described by Prof. Owen in the 'Annals of Natural History' for 1847, and the corresponding parts of the skeleton of the new species of *Plesiosaurus* described by Prof. Huxley in the last Number of the 'Geological Journal.'

We will first consider the structure of this specimen (Pl. XIII. figs. 1 & 2). The four bones composing the atlantal cup have been slightly displaced; and its shape is a little altered. The base of the neural canal is formed anteriorly partly by its centrum and partly by the expanded bases of the neurapophyses; posteriorly the centrum is much larger, and forms the entire base of the canal. The upper thirds of the neurapophyses are much expanded and bent backwards, their inner angles have not coalesced, and there is no trace of a neural spine. The anterior surfaces of the lower part of the neurapophyses are concave, and form the antero-lateral segments of the articular cup for the occipital condyle; laterally their inferior edges slightly overlap the first wedge-bone; posteriorly they thin away, exposing the postero-lateral edges of the centrum (fig. 1, c.).

* Communicated by the Author, having been read at the Meeting of the British Association at Leeds.

That part of the centrum which forms the middle of the upper half of the atlantal cup (fig. 1, c.) is hexagonal, and it has a small pit in its centre; posteriorly its articular face is three times as great (nearly as large as the articular surface of the body of the axis), and has a circular depression in the middle. The wedge-bone (fig. 1) forms the lower half of the articular cup, and has been produced behind into two long processes, the bases of which only remain.

The neural spine of the axis (fig. 2, n. s.) is long, and much thicker than that of any of the succeeding cervical vertebræ; the apex is broken off in this specimen. The neurapophyses are separated from the centrum by a distinct suture; and an oblique ridge connects on each side the anterior with the posterior zygopophysis. The antero-inferior edge of the axis is bevelled-off, forming an articular surface for the second wedge-bone; and the basal portions of two cervical ribs (figs. 2 & 2 a, P. L.) remain attached to the anterior lower part of the centrum: they must have partly articulated with the second wedge-bone.

The axis of *Plesiosaurus Etheridgii*, lately examined by Prof. Huxley, agrees entirely with that of this species; but there are some important modifications in the structure of the atlas.

Prof. Huxley describes the atlantal cup in this species as being divided by a triradiate mark into three portions—one inferior and two lateral and superior. The inferior piece corresponds with the lower half of the atlantal cup, or the anterior subvertebral wedge-bone, and the two supero-lateral pieces to the neurapophyses in the specimen first described, but their bases are much more developed.

There is a small circular bone in the centre, which Prof. Huxley considers to belong to the os odontoideum; it is the anterior articular face of that bone, and corresponds to the hexagonal bone in the middle of the upper half of the atlantal cup in the former species,—the difference in position being caused in this species by the great development of the supero-lateral pieces or bases of the neurapophyses.

The postero-lateral edges of this bone are greatly developed, forming a rounded ridge on both sides of the posterior part of the atlas: the extraordinary development of this part of the bone is the most remarkable feature in the atlas and axis of this species.

We now come to the species first described by Prof. Owen. We have two specimens, in the Woodwardian Museum, of this species, both from the Kimmeridge Clay of Haddenham, near Ely; the larger of the two was figured by Prof. Owen in the 'Annals of Natural History,' vol. xx.

The neural arches in both specimens are broken away; and

the bodies of the two vertebræ have so coalesced, that the original line of separation is scarcely visible. The neurapophyses and cervical ribs of the axis have become anchylosed to the bodies of that vertebra. The posterior half of the bottom of the neural canal in the atlas is formed by the true centrum of that vertebra; but in the anterior half the bases of the neurapophyses have spread over the centrum, and have united at the medial line. On the upper part of the atlantal cup a groove indicates the position of the original suture between the bases of the neurapophyses and the lower part of the atlantal cup. In the larger specimen there is a trace of the suture which separated the anterior subvertebral wedge-bone from the upper part of the atlas, but which is absent in the smaller specimen.

In the atlas of the three species of *Plesiosaurus* we have now considered, the anterior articular face of the atlas is made up of four bones: of these, the os odontoideum is the most variable in size. Prof. Owen correctly assigned to it a large share in the formation of the atlantal cup in the Kimmeridge Clay species. It forms about a third of the upper half of the cup in the young unanchylosed specimen, and in *P. Etheridgii* is extremely small. Its position varies: in the young specimen (figs. 1 & 1 a) it forms the base of the neural canal of the atlas; in the Kimmeridge Clay species (figs. 3 a & 3 b) it is overlapped by the expanded bases of the neurapophyses; and in *P. Etheridgii* it occupies the centre of the cup. The bases of the neurapophyses of the atlas are most developed in this species, and least in the Kimmeridge Clay species; in all cases the anterior subvertebral wedge-bone forms a large portion of the atlantal cup. That the suture between this bone and the os odontoideum, in the atlas of the species figured by Prof. Owen in the 'Annals' for 1847, is correct, we have abundant proof in the structure of the atlas of *Pliosaurus*, where the os odontoideum is of exactly the same shape, and the wedge-bone separated from it by a similar suture.

It is remarkable that the Kimmeridge Clay species approaches more nearly the Ichthyosaurian type than the Lias species, not only in the greater development of the os odontoideum and in its lateral edges forming the lateral margins of the atlas, but in its supporting the neurapophyses; there is really no essential difference between the atlas of this species and the atlas of *Ichthyosaurus*.

The atlas of *P. Etheridgii* and that figured (figs. 1 & 1 a) show many Crocodilian affinities (the neurapophyses being supported both by the wedge-bone and the centrum); but the posterior edge of the centrum does not support a pair of ribs (pleurapophyses), and no trace of ribs articulating with the wedge-bone have been discovered.

The second vertebræ of the same species support cervical ribs articulated to their bodies ; but in all other respects they resemble that of the Crocodile.

EXPLANATION OF PLATE XIII.

- Fig. 1.* Anterior view of the atlas of *Plesiosaurus* from the Lias : n. p. neurapophysis ; c. centrum.
Fig. 2. Axis of the same species : n. s. neural spine ; n. p. neurapophysis ; c. centrum ; p. l. pleurapophysis.
Figs. 1 a & 2 a. Lateral views of the same vertebræ :—the same letters indicate the same parts as in figs. 1 & 2.
Fig. 3 a. Lateral view of the anchylosed atlas and axis of *Plesiosaurus* from the Kimmeridge Clay.
Fig. 3 b. The articular cup of the same specimen : n. p. neurapophysis ; c. centrum.

BIBLIOGRAPHICAL NOTICES.

Handbook of Zoology. By J. VAN DER HOEVEN, Professor of Zoology in the University of Leyden. Translated from the second Dutch Edition, by the Rev. WILLIAM CLARK, M.D., F.R.S. &c. 2 vols. 8vo. London, Longmans, 1856–1858.

CONSIDERING the high reputation enjoyed by the ‘*Handbook of Zoology*’ of Professor Van der Hoeven, not only on the Continent, but also amongst many English naturalists, it would be a work of supererogation were we to enter here upon any detailed criticism of its merits. A short notice of the classification adopted by the learned Professor of Leyden will, however, probably be acceptable to many of our readers ; and we shall therefore venture to give a general outline of it before proceeding to the more legitimate object of the present notice—the consideration of the mode in which Dr. Clark has executed his translation of this important work.

Professor Van der Hoeven commences his ‘*Handbook*’ with a general introduction to the study of zoology, containing a brief account of the distinctions between inorganic and organic bodies, and of the two great kingdoms into which the latter are divided,—an abstract of the tissues of animals, which he compares with the proximate elements of the chemist,—a very brief description of the structure and functions of the principal organs and of the development of animals,—and concluding with a short treatise on the art of classifying. In this he gives the characters of Cuvier’s four great divisions of the Animal Kingdom, to which he adds a fifth, the Protozoa, in a foot-note ; but in his own classification he discards this distribution “except as a guiding idea,” and divides the whole series of animals into seventeen great independent classes. We cannot help considering it a thing to be regretted that this “guiding idea” should not have been rendered more prominent and palpable to the reader ; by taking the opposite course, Professor Van der Hoeven has lost the